7 INSTRUMENTATION

7.1 Assignments

7.1.1 Differentiate between the following:

- compound microscope
- stereo microscope
- comparison microscope

(*Use Training Assignment #30 and Practical Exercise #7 to complete this objective*.)

_____ _____
Training Officer Date

7.1.2 Study the instruction manual for the various brands of stereo microscopes. Determine how to insert a reticle and how to check the calibration of the microscope.

(*Use Practical Exercise #7 to complete this objective*.)

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Training Officer Date

7.1.3 Familiarize yourself with the instruction manuals and the mechanical and optical aspects of the various brands of comparison microscopes in the Firearm Section. Note the differences and similarities in each, both mechanically and optically.

(*Use Training Assignment #30 and Practical Exercise #7 to complete this objective*.)

_____ _____
Training Officer Date

7.1.4 Be familiar with the following types of light sources, which are in use in the Firearm Section on the comparison microscopes.

- Fluorescent
- Fiber optics (*with and without filters*)

(***Use Training Assignment #30 and Practical Exercise #7 to complete this objective*.)**

_____ _____
Training Officer Date

7.1.5 Using each type of light source in the field of view on a comparison microscope, note the differences in the quality of each using the following different surfaces: lead bullets, jacketed bullets, various types of cartridge cases, and various types of surfaces containing impressed and striated toolmarks. Manipulate the above light sources with respect to angle and vary the intensity of the light source, if possible. Gain an appreciation for the effects of varying the angle and intensity for each light source on each type of surface. Discuss this with the Training Officer.

(***Use Training Assignments #30 and #31 and Practical Exercises #7 and #8 to complete this objective.***)

_____ _____
Training Officer Date

7.1.6 Set up a comparison microscope for your vision requirements and focus the "*hairline*." Prepare the microscope for use, and be familiar with each set of objective lenses on the comparison microscope. Become familiar with the different types of Polaroid film and/or other photographic systems used in the Firearm Section with the comparison microscopes. Master the use of the Polaroid Land film holder. Using all of the objective lenses, make timed exposures of the same objects while varying the intensity and angle of the light sources. Calculate the magnification for each set of objective lenses on your comparison microscope.

(***Use Training Assignment #30 and Practical Exercise #7 to complete this objective.***)

_____ _____
Training Officer Date

7.1.7 Become familiar with and demonstrate the use of the following equipment:

- Speed micrometer
- Inertia bullet puller
- Steel rule
- Reticle in ocular lens of binocular microscope
- Ainsworth scale
- Balances and scales located in the Firearm Section
- Stage micrometer
- Digital (electronic) micrometer
- Depth gauge (Federal brand or equivalent for firing pin impression measurements

(***Use Training Assignment #31 and Practical Exercise #8 to complete this objective.***)

_____ _____
Training Officer Date

7.2 REFERENCE MATERIALS/MICROSCOPY AND INSTRUMENTATION

The following reference materials serve several purposes:

- To provide a wider range of additional resources in a given topic
- To provide reference materials for future use
- To gain additional in depth knowledge in a particular subject area

Other references in this category should be made as additional notes at the end of this listing

7.2.1 AFTE Journal

Biasotti, A.A., "Photomicrography and Illumination: Some Critical Factors," 1979; 11(4):60.

Chamberlain, D., "Microscope Comparison Bridge," 1972; 4(1):9.

Cook, C.W., “Basic Optics,” 1985; 17(4):14.

Haemmerle, C., “Easily Made Diffusers for Fiber Optic Illuminators,” 1990; 22(4): 446-447.

Hueske, E.E., “Application of Fiber Optic Videomicroscopy to Firearm and Toolmark Examination: A Further Look,” 1993; 25(2):132-139.

---. “Preliminary Report on the Application of Fiber Optic Videomicroscopy to Firearm and Toolmark Examination,” 1990; 22(3):280-287.

Lansing, J.F., “Customized Comparison Microscope,” 1973; 5(5):25.

Lutz, M.C., “Evaluation of New Fiber Optics System,” 1986; 18(1):12.

Moran, B., “Building an Inexpensive High Intensity Fluorescent Lighting System for the Comparison Microscope,” 1997; 29(1):49-54.

Ziegler, P.A., “Examination Techniques: The Beam Splitter and Reverse Lighting,” 1983; 15(2):37.

7.2.2 Periodicals

Schlueter and Gumperty, “The Stereomicroscope - Instrumentation and Techniques,” American Laboratory, Apr. 1975.

7.2.3 Manuals

Leica Microsystems, Inc., “Operating Instructions for the K2700 Universal Forensic Microscope (UFM IV).”

---. “The Leica Universal Forensic Microscope”

---. “Reference Manual, Photostar Automatic Camera System”

---. “The Leica DMC Comparison Microscope”

7.2.4 Basic References

American Optical, "Procedure for Bullet Comparison"

Bartels, P., "Microscope Optics”

Needham, G.H., "The Microscope A Practical Guide”

◆ **End**